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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/835,498	04/16/2001	Ki Young Oh	P/2292-43	5377

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EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1765

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DATE MAILED: 12/11/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/835,498	Applicant(s) OH ET AL	
	Examiner Matth w J Song	Art Unit 1765	

AS-8

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 5-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sivaramakrishnan et al (US 5,879,574) in view of Adams et al (US 5,085,887) and Nishizawa et al (US 6,464,793) and Tsuchimoto (US 3,916,034).

Sivaramakrishnan et al discloses a Chemical vapor deposition (CVD) apparatus includes a susceptor 25 installed inside the reactive chamber, a heater/lift assembly 30 and a remote microwave plasma system 55 to deposit plasma enhanced CVD films by inputting deposition reactive gases into system 55 via input line 57 (col 14, ln 20-25). Sivaramakrishnan et al also discloses for plasma processes the CVD apparatus will include a gas feed-through box housing gas passages 83, 85 to enable the application of high voltage RF power to the gas box (col 26, ln 40-45). Sivaramakrishnan et al also discloses a vacuum pump is activated to generate vacuum pressure within a pumping channel, thereby drawing the process gases and plasma residue out of the processing chamber through a exhaust port 361 (col 35, ln 33-37 and Fig 4 and 8), where the exhaust port reads on applicant's gas outlet. Sivaramakrishnan et al also discloses a process selector subroutine 153 identifies the desired set of process parameters needed to operate the process chamber, where the process parameters include process gas composition and flow rates, temperature, pressure, plasma composition and chamber wall temperature (Fig

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1D and col 17, ln 20-35). Sivaramakrishnan et al discloses a process gas control subroutine 163 for controlling the process gas composition and flow rates, which reads on applicant's gas supply controller (col 18, ln 50-67) and heat control subroutine 167 for controlling the temperature (col 19, ln 58-67), which reads on applicant's temperature controller.

Sivaramakrishnan et al does not disclose a reactive chamber consisting of an upper container and a lower container junctioned by an O-ring.

In a reaction vessel apparatus for processing semiconductor wafers, Adams et al teaches a thermal reactor 10 is formed by a reactor vessel 10V, defining a wafer reactor chamber 10C with a wafer cover member 12 with a central window 12W and a O-ring 15B (Fig 1), where the region above the O-ring reads on applicant's upper container and the region below reads on applicant's lower chamber. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sivaramakrishnan et al with Adams' reactor vessel because the reactor vessel has a window portion suitable for both reduced pressure and ambient pressure applications (col 1, ln 60-67)

Sivaramakrishnan et al does not disclose at least two gas supply controllers respectively installed at the gas supply pipes to repeatedly supply the material gases alternately into the chamber.

In a semiconductor crystal growth apparatus, note entire reference, Nishizawa et al teaches a vessel 1 includes nozzles 4 and 5 for introducing gaseous compounds, where the nozzles 4 and 5 are provided with on-off valves 6 and 7 for controlling the introduced amounts of gaseous compounds. Nishizawa et al also teaches a control unit 18 controls the opening and closing of the valves 6 and 7 for alternately and repeatedly introducing

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gases (col 4-5 and Fig 3). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sivaramakrishnan et al with Nishizawa et al to grow an epitaxial layer having a desired thickness can be attained with precision as precise as a single molecular layer (col 4, ln 60-67) and to prevent undesired reactions between two or more source gases.


Sivaramakrishnan et al does not disclose at least two remote plasma generators installed outside the reactive chamber.

In a method of transporting plasma to a substrate to grow a single crystal of material on a substrate, note entire reference, Tsuchimoto teaches two or more selected materials are turned into separate ionized plasmas in separate plasma generating chambers 1a and 1b (Abstract and Embodiment 2). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Sivarmakrishnan et al with Tsuchimoto because a plurality of materials, which cannot coexist in a single plasma generator can be separately turned into the corresponding plasma (col 9, ln 1-67).

Referring to claim 3, the combination of Sivaramakrishnan et al, Adams et al, Nishizawa et al, and Tsuchimoto teaches a heater/lift assembly 30.

Referring to claim 4 the combination of Sivaramakrishnan et al, Adams et al, Nishizawa et al, and Tsuchimoto teaches a vacuum pump attached an exhaust port.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sivaramakrishnan et al (US 5,879,574) in view of Adams et al (US 5,085,887) as applied to claim 1 above, and further in view of Amano et al (US 5,948,485).



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The combination of Sivaramakrishnan et al, Adams et al, Nishizawa et al, and Tsuchimoto teaches all of the limitations of claim 2, except a grounding unit connected to the upper container and lower container to clean the inside of the chamber and a RF power generator connected to the susceptor to apply an RF power to the susceptor.

In an apparatus for plasma deposition, Amano et al teaches a plasma process apparatus includes a container 2 divided into two parts, a plasma chamber 21 and a reaction chamber 22, where the vacuum container 2 is grounded at zero potential. Amano et al also teaches aluminum stage 52 for use as a susceptor and the stage is connected with a radio-frequency power supply unit 61 for plasma lead-in through a blocking capacitor. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Sivaramakrishnan et al, Adams et al, Nishizawa et al, and Tsuchimoto with Amano's susceptor connected with a radio-frequency power supply because ions are confined to the target object on the susceptor (col 5, ln 1-10). Also it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Sivaramakrishnan et al, Adams et al, Nishizawa et al, and Tsuchimoto with Amano's grounded container because it protects the integrity of the chamber and the chamber circuitry from any static discharge or induced electrical currents that may build in or on the chamber.

Response to Arguments

4. Applicant's arguments with respect to claims 1-4 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Yoder (US 5,281,274) teaches alternately and repeatedly introducing reactant gases associated flow controllers **64, 66** (col 7-8).

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
December 9, 2002


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700